

CLAIMS

What is claimed is:

1. A method of optimizing production from a formation without creating undue risk of mechanical instability of the formation, comprising:
  4. sensing a bottom hole flowing pressure;
  6. comparing the bottom hole flowing pressure to a stability envelope for the formation; and
  9. adjusting fluid production to maintain the bottom hole flowing pressure within a desired region of the stability envelope.
1. 2. The method as recited in claim 1, further comprising adjusting a sensor sampling rate as a function of the position of the bottom hole flowing pressure in the stability envelope.
1. 3. The method as recited in claim 1, wherein sensing comprises sensing the bottom hole flowing pressure repeatedly and periodically.
1. 4. The method as recited in claim 1, wherein comparing comprises utilizing a computerized device to automatically compare the bottom hole flowing pressure to the stability envelope.
1. 5. The method as recited in claim 1, wherein adjusting comprises adjusting a valve to change the fluid production rate.

- 1 6. The method as recited in claim 1, wherein adjusting comprises adjusting a choke  
2 to change the fluid production rate.
- 1 7. The system as recited in claim 1, wherein adjusting comprises adjusting an  
2 artificial lift mechanism to change the fluid production rate.
- 1 8. A method of optimizing production from a formation, comprising:  
2  
3 comparing a bottom hole flowing pressure to a reservoir pressure in real-  
4 time to determine an underbalance as a fluid is produced from the formation; and  
5  
6 continuously adjusting the bottom hole flowing pressure to maintain the  
7 level of underbalance in proximity to a predetermined maximum underbalance for  
8 a measured reservoir pressure.
- 1 9. The method as recited in claim 8, wherein comparing comprises continuously  
2 sensing the bottom hole flowing pressure and the measured reservoir pressure.
- 1 10. The method as recited in claim 9, wherein continuously sensing comprises  
2 periodically sensing the bottom hole flowing pressure.
- 1 11. The method as recited in claim 9, wherein continuously sensing comprises using a  
2 downhole pressure sensor to determine the bottom hole flowing pressure.
- 1 12. The method as recited in claim 8, wherein continuously adjusting comprises  
2 automatically adjusting the production flow rate of the fluid.
- 1 13. The method as recited in claim 12, wherein adjusting the production flow rate  
2 comprises adjusting a valve.

- 1 14. The method as recited in claim 12, wherein adjusting the production flow rate
- 2 comprises adjusting a choke.
- 1 15. The method as recited in claim 12, wherein adjusting the production flow rate
- 2 comprises adjusting an artificial lift mechanism.
- 1 16. A system for optimizing production from a formation, comprising:
  - 2 a completion deployed in a wellbore, the completion having a flow control
  - 3 mechanism able to control the rate at which a fluid is produced through the
  - 4 wellbore;
  - 5
  - 6 a reservoir pressure sensor;
  - 7
  - 8 a bottom hole flowing pressure sensor; and
  - 9
  - 10 a stability envelope for the formation, wherein the flow control
  - 11 mechanism is adjustable to maintain the ratio of bottom hole flowing pressure to
  - 12 reservoir pressure within a specific region of the stability envelope.
  - 13
- 1 17. The system as recited in claim 16, wherein the flow control mechanism comprises
- 2 an artificial lift mechanism.
- 1 18. The system as recited in claim 16, further comprising a computerized controller to
- 2 receive signals from the reservoir pressure sensor and the bottom hole flowing
- 3 pressure sensor and to automatically adjust the flow control mechanism based on
- 4 the signals received.
- 1 19. The system as recited in claim 16, wherein the flow control mechanism comprises
- 2 a valve.

- 1 20. The system as recited in claim 17, wherein the flow control mechanism comprises  
2 a choke.
- 1 21. The system as recited in claim 16, further comprising a control system to compare  
2 the reservoir pressure and the bottom hole flowing pressure to the stability  
3 envelope and to automatically adjust the bottom hole flowing pressure.
- 1 22. A method of optimizing production of a fluid from a formation without  
2 incurring sanding due to mechanical instability of the formation, comprising:  
3  
4 monitoring in real-time a reservoir pressure of the formation and a bottom  
5 hole flowing pressure proximate a production completion; and  
6  
7 periodically adjusting the ratio of bottom hole flowing pressure to  
8 reservoir pressure to maintain the ratio at a desired position relative to a  
9 predetermined line representative of the maximum pressure ratio underbalance for  
10 the formation.
- 1 23. The method as recited in claim 22, wherein monitoring comprises utilizing a  
2 downhole pressure sensor.
- 1 24. The method as recited in claim 22, further comprising deploying a completion in a  
2 wellbore to control production of the fluid.
- 1 25. The method as recited in claim 24, wherein deploying comprises suspending the  
2 completion on a tubing through which the fluid is produced.
- 1 26. The method as recited in claim 22, wherein deploying comprises deploying a  
2 completion having a flow control mechanism adjustable to control a production  
3 rate and the bottom hole flowing pressure.

- 1 27. The method as recited in claim 22, wherein periodically adjusting comprises  
2 automatically adjusting the bottom hole flowing pressure.
- 1 28. The method as recited in claim 22, further comprising adjusting a sensor sampling  
2 rate as a function of the ratio of bottom hole flowing pressure to reservoir  
3 pressure.
- 1 29. A system for optimizing production of a fluid from a formation without  
2 incurring sanding due to mechanical instability of the formation, comprising:  
3  
4 means for monitoring a reservoir pressure of the formation and a bottom  
5 hole flowing pressure proximate a production completion; and  
6  
7 means for periodically adjusting the ratio of bottom hole flowing pressure  
8 to reservoir pressure to maintain the ratio at a desired position relative to a  
9 predetermined line representative of the maximum pressure ratio underbalance for  
10 the formation.
- 1 30. The system as recited in claim 29, wherein the means for monitoring comprises a  
2 pressure sensor.
- 1 31. The system as recited in claim 29, wherein the means for periodically adjusting  
2 comprises a flow control mechanism by which bottom hole flowing pressure is  
3 changed.